9/11/98 OPM No. 5.3.3.0

ALARA POLICY AND RESPONSIBILITIES

RHIC PROJECT

This document establishes the policy and responsibilities for the RHIC Project system of dose limitation and reduction:

1. No job, experiment or practice involving radiation dose shall be adopted unless its introduction produces a positive net benefit.

2. RHIC Project staff shall keep all individual and collective doses as low as reasonably achievable, with operational, economic and social factors taken into account.

3. The dose to individuals shall not exceed the dose limits set for the appropriate circumstances by 10 CFR 835 and the BNL RadCon Manual.

This procedure is primarily concerned with the second of these components of the system of dose limitation and reduction. Additionally, this procedure provides a description of the Project organization used to keep radiation dose as low as reasonably achievable.

I. ALARA POLICY

It is the policy of Brookhaven National Laboratory to conduct its operations and research in a manner to protect the health and safety of employees, contractors, and the public. The management of Brookhaven National Laboratory is committed, in all its activities, to reduce any safety or health risks associated with radioactive materials and ionizing radiation to levels that are as low as reasonably achievable. Individual and collective doses, as well as the release of radionuclides to the environment, shall be maintained as far below the limits specified by DOE regulatory requirements as technical, economic, practical, and public policy considerations permit.

The as low as reasonably achievable process of reducing radiation dose is desirable because of the direct relation of such reduction to the health and safety of both employees and the public. Reducing radiation dose improves the workplace and, in the long run, saves resources. This process is therefore a fundamental requirement of the Laboratory's Radiological Control Program.

Three basic approaches to the as low as reasonably achievable process must be followed in these facilities:

1. Radiological and safety design considerations will be applied to the design and modification of facilities to reduce dose to individuals and release to the environment.

2. Radiological controls will be carried out during operations, research, maintenance, and other support activities to minimize dose.

3. Monitoring of radioactive material and radiation, together with measurements of worker radiation dose, will be performed to validate and document that dose is being maintained as far below the regulatory limits as is reasonably achievable.

II. RESPONSIBILITIES

A. The charge of the ALARA Committee is:

1. Review the RHIC Project facilities and experiments for ALARA issues as part of the their initial design process.

2. Review accelerator "conduct of operations" that have a direct impact on creating activated materials, irradiating nearby facilities, or causing radioactive emissions or waste streams.

3. Review RHIC ESHSD Group "conduct of operations" that have a direct impact on dose reduction efforts, or on measuring and reporting dose or dose rate to Project management.

B. Specific ALARA Responsibilities

1. See Attachment 1 for a listing of specific ALARA responsibilities. See Attachment 2 for a listing of personnel in the RHIC Project with specific ALARA responsibilities.

2. Annually, the ALARA Committee shall review any established ALARA goals. Before setting goals, the Committee shall review the levels of occupational dose, radioactive waste generation and ambient radiation levels in and around the RHIC complex. Where appropriate, the Committee may choose to establish goals for personnel dose for specific major efforts or for specific groups within the complexes. Where data are

available, goals for radioactive effluent discharge and radioactive waste volume may also be established.

3. If requested, the Committee shall evaluate suggestions from the ALARA Suggestion Program that is part of the Laboratory Employee Suggestion Program.

4. The ALARA Committee Chairman is responsible for promptly scheduling an ALARA review of a project, experiment or job. He/she is responsible to see that the minutes of the meetings are written and distributed.

5. The ALARA Committee is responsible for reviewing the estimated radiation doses and reviewing the methods for reducing them.

6. The RHIC personnel assigned to oversee a project, experiment or specific task (e.g., project leaders, liaison physicists, liaison engineers, supervisors) are responsible to consider if there are associated ALARA issues. Triggers for the ALARA Committee reviews are given in RHIC OPM 9.2, 9.4 and 9.5. If applicable, personnel assigned to oversee a project, experiment or specific task must request that the project, experiment or task be reviewed by the ALARA Committee. They must provide a written description of the ALARA issues and the proposed methods to reduce doses to as low as reasonably achievable.

7. The ALARA Committee shall track recommendations through to completion. The Committee shall keep all records that relate to facility, experiment or project reviews that are performed by the Committee.

III. IMPLEMENTATION

A. Scope of Program

Regardless of whether or not an ALARA Committee review is required, line supervisors, liaison physicists, liaison engineers and project leaders shall review the following for ALARA issues:

1. All experiments.

2. All capital improvement proposals (AIPs, GPPs).

3. All tasks requiring a Radiation Work Permit.

4. All new accelerator systems, subsystems, and modifications.

B. Administration of Dose

1. RHIC management must keep the dose to workers as low as reasonably achievable and in no case shall the dose to trained Radiation Workers exceed the following administrative guidelines:

Period of Interest	**Maximum Individual Dose with Line Authority Approvals (mrem)**
Calendar Year Annual Dose	1250 to 2000 (Laboratory Director Approval)
Calendar Year Annual Dose	1000 to 1250 (Project Director Chairman) 500 to 1000 (Project Director Chairman)
Daily Dose	50 to 100 (Approval authority will be indicated on the RWP)

2. The maximum daily dose to trained Radiation Workers shall be 50 mrem. A first line supervisor may approve a dose between 50 and 100 mrem. The ESHSD Representative shall be notified that such an approval was given.

3. The maximum calendar year dose to trained Radiation Workers shall be 500 mrem. The Project Director may approve a dose of 500 - 1000 mrem. If necessary, the Project Director may approve a dose of 1000 - 1250 mrem.

4. The Laboratory Director may approve a dose between 1250 and 2000 mrem.

5. The maximum allowable dose to a worker or guest who is not trained in Rad Worker I or II and who is escorted in radiological areas is 25 mrem.

6. After a female Radiation Worker voluntarily notifies the Project management that she is pregnant, she is considered a declared pregnant worker for the purpose of fetal/embryo dose protection. The dose during the gestation period shall be no greater than 200 mrem at a rate of no greater than 20 mrem per month. The Project Director approve a dose between 200 and 500 mrem.

7. The maximum allowable dose to minors and students under 18 is 25 mrem. Exposures shall be administratively controlled by not allowing students under the age of 18 to work in Controlled or Radiological Areas without written permission from the appropriate Project Director and concurrence from the ESHSD Health Physics Group.

C. Documents

The following documents were developed to carry out a formal ALARA program:

1. RHIC OPM 9.2 ALARA Design Review Procedure
2. RHIC OPM 9.3 ALARA Audit Procedure
3. RHIC OPM 9.4 Radiation Work Permit
4. RHIC OPM 9.5 ALARA Job/Experiment Review Procedure
5. RHIC OPM 9.6 Cost/Benefit Analysis
6. RHIC OPM 9.7 ALARA Goal Procedure

IV. ALARA COMMITTEE

		Appointment Date
S. Musolino	Chairman	01/31/97
D. Beavis		01/31/97
A. Etkin		01/31/97
C. Schaefer		01/31/97
A. Stevens		01/31/97

V. DEFINITIONS

Administrative Levels - dose guidelines set down in this procedure.

ALARA - as low as reasonably achievable.

Collective Dose - the sum of dose equivalent of all individuals in an exposed group.

DOE Dose Limits - dose limits set down in DOE 10 CFR 835 and the BNL RadCon Manual.

Dose - whole-body dose equivalent\effective dose equivalent.

VI. REFERENCES

A. Occupational Dose Reduction at Department of Energy Facilities, Study of ALARA Programs - Good Practice Documents, DOE/EH-xxx, July 1991.

B. Health Physics Manual of Good Practices for Reducing Radiation Exposure to Levels that are As Low As Reasonably Achievable, PNL-6577, June 1988

C. Cost-Benefit Analysis in the Optimization of Radiation Protection, Annals of the ICRP, ICRP 37, V10 No. 2/3, 1983.

Satoshi Ozaki 9/15/98

APPROVED _____ **DATE** _____

RHIC Project Director

OPM 5.3.3.0 ATTACHMENT 1: 9/11/98

ALARA RESPONSIBILITIES

I. Project Director

A. Authorize and issue the derivative ALARA Committee procedures.

B. Decide which radiological areas need improvement and approve annual ALARA goals.

C. Ensure that the authority, accountability, and resources for implementing the ALARA program are assigned to the levels of the organization which are needed to achieve the goals.

D. Ensure that line management is committed to and supports the ALARA and radiological safety program.

E. Appraise performance of line managers based on their success in achieving their ALARA goal(s).

II. FIRST OR SECOND LINE SUPERVISORS

A. Promote ALARA attitudes and philosophy in the employees under your direction by demonstrating support and commitment to ALARA.

B. Review plans, procedures, equipment, and the work areas to ensure that radiation exposure and the control of radioactive materials are ALARA.

C. Ensure that adequate manpower and resources are provided to implement ALARA procedures.

D. Ensure that employees obey all RWP requirements.

E. Attend pre-job planning briefings, post-job debriefings, and ALARA Committee meetings, as required.

F. Develop and strive to achieve Project ALARA goals.

G. Review and report the status of ALARA goals to the ALARA Committee.

H. Ensure that employees attend the appropriate training in radiological safety and ALARA.

I. Carry out operations in such a manner that exposures to workers, researchers, releases to the environment, and the general public are maintained as far below the limits as is reasonably achievable.

J. Implement all relevant ALARA program requirements.

K. Report radiological accidents, incidents, and other unsafe radiological conditions, including workers' radiological concerns and any associated corrective actions to the appropriate level of management.

III. ALARA COMMITTEE CHAIRMAN

A. Provide technical support and assistance to management and staff in implementing the programmatic elements of the ALARA program.

B. Develop, review, and document these elements according to the ALARA policy, program manual, and procedures.

C. Assist in developing and reviewing ALARA training programs.

D. Document and evaluate occupational and general public dose data. Disseminate this data to management for the purpose of tracking administrative dose control levels and ALARA goals.

E. Ensure the activities of the ALARA Committee are coordinated and documented.

F. Ensure that Project management, physicists and engineers are made aware of the best available technology to reduce dose and the spread of radioactive materials.

G. Coordinate the Project facility's radiation protection program including the incorporation of ALARA controls into radiological work, research, and surveillance.

IV. COGNIZANT PHYSICISTS AND PROJECT LEADERS

A. Provide technical support and assistance to supervisors, planners, schedulers, users, and design engineers in implementing the radiological design and operational control elements of the ALARA program.

B. Develop, review, and document the radiological design and operational control elements of the ALARA program according to the ALARA policy and procedures.

C. Present new project or experiment designs to the ALARA Committee for review.

V. ALARA/RADIOLOGICAL CONTROL COORDINATORS

A. Review procedures and RWPs for radiological work, high dose jobs, high dose experiments, and facility design changes, and recommend improvements to reduce dose and the spread of radioactive materials.

B. Provide technical support for installing and using shielding, remote power tools, containment, spray systems, decontamination, ventilation, and mock-up designs, as needed.

VI. ESHSD REPRESENTATIVE

A. Assist managers and supervisors of operations, maintenance, research, and other support groups to ensure that ALARA is practiced and that ALARA goals are achieved.

B. Provide the radiological safety expertise to support the implementation of all aspects of the radiation protection program.

C. Review selected procedures and RWPs for radiological work, high dose jobs, high dose experiments, and facility design changes, and recommend improvements to reduce dose and the spread of radioactive materials.

D. Report radiological incidents, accidents, and unsafe conditions, including concerns from the radiological staff and any associated corrective actions, to management.

E. Stop work when conditions and practices are unsafe and/or would violate Laboratory safety policy. Immediately report work stoppage to the Project and ESHSD management.

VII. ESHSD HEALTH PHYSICS TECHNICIAN

A. Conduct radiological surveillance, establish controls for exposure and contamination controls, and prescribe protective requirements during radiological work to reduce dose and the spread of radioactive materials.

B. Provide first line supervisors and workers with ALARA and radiological safety expertise through pre-job briefings, routine monitoring of RWP requirements, and post-job debriefings.

C. Maintain radiation exposure and the spread of radioactive materials as low as reasonably achievable during surveys, posting, and job monitoring.

D. Report any radiological problems, along with any corrective actions, to the ESHSD Representative.

VIII. COGNIZANT ENGINEERS

A. Incorporate radiological design features to reduce dose and the spread of radioactive materials to levels that are as low as reasonably achievable into new facilities, modifications to existing facilities, and construction projects.

B. Incorporate the best available technology and designs to achieve the lowest reasonable radiological consequences to accommodate future reductions in occupational and general public dose limits.

C. Balance the cost of various protective measures and modifications for personnel safety to minimize the overall risk to the individual.

IX. PROJECT TRAINING MANAGER/COORDINATOR

A. Develop, maintain, and provide training and retraining programs to ensure that the ALARA program is implemented as required.

B. Document ALARA training.

X. RADIATION WORKER

A. Reduce your, and to the extent possible, your co-workers' radiation exposure to levels that are as low as reasonably achievable.

B. Minimize the spread of radioactivity and activated materials.

C. Observe all radiological signs.

D. Obey all ALARA-related instructions from ESHSD Health Physics Technicians and follow all RWP requirements.

E. Attend pre-job planning briefings, special mock-up training, post-job debriefings, and ALARA Committee meetings, as required.

F. Report any radiological problems along with any associated corrective actions to your supervisor.